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WAGE STATISTICS IN THE TWELFTH CENSUS.

FOR the second time in the history of the federal census the statistics of wages have been made the subject of an exhaustive special report¹ prepared under the direction of an expert statistician. The publication of this volume marks an important point in the development of wage statistics in the United States, and it seems worth while to consider at some length certain questions regarding it: (1) How does the scope of the inquiry differ from that of previous census investigations into wages? (2) In what respect is the method of presentation and tabulation new, and what are the relative advantages or disadvantages of this method of treatment? (3) What conclusions are reached regarding the trend of wages during the decade?

The one other census volume which gives a detailed presentation of wage statistics is the work of Mr. Joseph D. Weeks for the Tenth Census. Many of the data collected are for a period of fifty years, and while the scope is much broader than that of Professor Dewey's report, which presents returns only for 1890 and 1900, the latter is immeasurably superior in the completeness and accuracy of its statistics;² and, indeed, it would be saying that there had been small progress in statistical method in the last twenty years if this were not so.

Except for this work of Mr. Weeks, all wage statistics in the census up to the present time have been included in the Census of Manufactures, and in general their purpose has been to show the

¹ DAVIS R. DEWEY, *Employees and Wages*. (Washington: United States Census Office, 1903.)

² To make this clear it is necessary only to point out that Mr. Weeks gives only a single wage for each class of laborers, and we do not know by what method of averaging it was obtained; the number of laborers employed at this wage is not given; and frequently there is no discrimination as to sex. For a careful and appreciative criticism of the work of Mr. Weeks see MITCHELL, *History of the Greenbacks*, p. 377, and BULLOCK, *Publications of the American Economic Association*, New Series, Vol. I, p. 351.

total amount paid out in wages, the number of employees, and then, by a simple process of division, the "average wage" for the census year. The result has been the collection from decade to decade of some statistics of wages which doubtless give some useful information regarding "cost of labor" in connection with the statistics of manufactures for the census year, but which have no significance whatever so far as the trend of wages is concerned. Such an average obviously cannot be comparable from census to census so long as different methods are used in determining what the divisor—the average number of wage-earners—shall be. The inclusion of officers and firm members at one period and not at another, greater thoroughness in the investigation of urban industries, or the use of the greatest number employed at one time and the average, or the number for some one month, at another, will cause a change in the "average wage" which is not indicative of any real change in the condition of the wage-earning class.³ Thus the average wage reported in the Tenth Census was \$346.91; in the Eleventh, \$444.83; in the Twelfth, \$437.96; and, however uncertain we may be regarding the exact movement of wages during these twenty years, we know that there has not been any such rise and fall as these figures indicate. To dismiss this subject entirely, it should perhaps be added that the directors of the Census of Manufactures in 1890 and 1900 have both frankly confessed that such statistics are not useful for purposes of comparison.⁴

³ MR. W. M. STEUART, director of the Eleventh Census of Manufactures, says that the true average number of wage-earners "is rarely reported, and the divisor is either greater or smaller than it should be in order to ascertain the average earnings." (*Publications of the American Economic Association*, New Series, Vol. I, p. 321. See also PROFESSOR DEWEY'S comment in the present volume, pp. xiii, xiv.)

⁴ It is found that "a comparison of the average annual earnings for all classes of employees as obtained from the reports of the two censuses is impracticable" (*Eleventh Census, Manufacturing Industries*, Vol. I, p. 14). "Considerations of this character justify the Census Office in affirming with all possible emphasis that the attempt to obtain the average earnings from the census figures or to establish a wage mean at the several census periods through the use of these statistics is a false use of them, and is not justified under any circumstances" (*Twelfth Census of Manufactures*, Vol. I, p. cxvii).

In the light of what the census has tried — and failed — to do in the past, we can properly appreciate the value of the special report and the necessity for it. The director of the Twelfth Census of Manufactures, having complied with that provision of the act providing for the census which required that the “number of employees and the amount of their wages” should be among the returns plainly showed that the work in this respect was of doubtful value, and that the result of any wages investigation so limited in its scope was to show, not the wages of labor, but the cost of labor; not the welfare of the individual wage-earner, but the “share which labor received as a whole without regard to its character, degree of skill involved, or continuity of employment.”⁵ Professor Dewey’s special report, then, is due to the recognition by the census authorities of the fact that the scope of the wage census would have to be extended, if results of any scientific value were to be obtained. It was, of course, necessary that data for 1890 as well as for 1900 should be collected, since the main purpose of the investigation was to show the trend of wages during the decade, and the statistics in the Eleventh Census were valueless as a basis of comparison.

The volume, though called *Employees and Wages*, does not, as its title might suggest, deal with the wage-earning class as a whole, but, since it is prepared as a supplement to the Census of Manufactures, its statistics all concern that portion of the industrial army employed in our manufacturing establishments. The investigation was conducted with the greatest care and thoroughness, and the returns represent all sections of the country, though attention is called to the fact that data from the “states classed in the census reports as western” are not sufficient to afford a “basis for a comparison of wages between that section and other parts of the country.” The schedule which we give below was used by the special agents in collecting data, and is a sufficient evidence of the thoroughness with which the work was done.

⁵ *Twelfth Census of Manufactures*, Vol. I, p. cxii.

MANUFACTURES.

Name of establishment.....
 Location
 Industry
 Goods manufactured
 Pay-roll of

[illegible]

All data collected underwent the most rigid inspection, and whenever there was reason to suspect that any of the statistics were not perfectly valid, they were of course summarily rejected. It is also worth noting that the wages of any persons who performed services of a clerical nature, as well as all salesmen and superintendents, were excluded, so that the rates given are

exclusively those of manual laborers employed in manufacturing industries.

The principles guiding the investigation are briefly stated to be (p. xiv) :

1. Restriction of the inquiry to a few stable and normal industries.
2. Collection of actual rates of wages.
3. Classification of employees by rates of wages and as far as possible by occupations.

In regard to the first of these principles, it is necessary to say only that the investigation was limited to thirty-four industries, and great care was taken to select those which are not much affected by "seasonal" influences.⁶ It is of course clear, so far as the second point is concerned, that really trustworthy results can be obtained only by the collection of actual rates, and it is to be regretted that these actual rates were not published in the tables. The pay-rolls of 720 establishments were used in the compilation of the tables, and 50 of these establishments employed more than 1,000 men, 74 more than 500, and 336 more than 100. From these figures there would seem to be no question that sufficient data had certainly been collected to show what the real movement of wages in the manufacturing industries had been.

From the point of view of statistical method, Professor Dewey's classification of employees is of the greatest interest, and it is, we believe, one of the chief merits of his work that he has not adopted the classification according to rates to the exclusion of the occupational classification. In spite of all that has been said in praise of the former method,⁷ the fact remains that,

⁶ The industries selected were: agricultural implements, bakeries, breweries, brickyards, candy, car and railroad shops, carpet mills, chemicals, cigars, clothing, collars and cuffs, cotton mills, distilleries, dyeing and finishing textiles, flour mills, foundries and metal-working, furniture, glass, iron, and steel, knitting mills, lumber and planing mills, paper mills, pianos, potteries, printing, rubber, shipyards, shoes, silk mills, slaughtering, tanneries, tobacco, wagons and carriages, woolen mills.

⁷ MR. NORTH, the director of the Census of Manufactures, spoke of the classification by rates — before the present volume was issued — as the "ideal treatment of the wages question according to the matured statistical experience and experiments of many years, in many bureaus, and many countries (*Twelfth Census of Manufactures*, Vol. I, p. cxii).

however valuable such a classification may be for some purposes, it does not permit the investigator to find out whether or not through any series of years there has been a change in the wages of men in any given occupation or of any given degree of skill — certainly pivotal points if the purpose be to discover the trend of wages. We hope the time is not far distant when it will be generally recognized that all wage statistics not based on an occupational classification can have only a very limited value. The development of the machine process has, of course, made such a classification increasingly difficult from decade to decade, and it is due to this fact that Professor Dewey has found it possible to tabulate separately only the most important of those occupations which are peculiar to some specific manufacturing industry, the others being grouped into “all other occupations peculiar” to the special industry or “general occupations not peculiar” to it. It is, of course, to be regretted that it should have been necessary to make any such groups as these last, for every such consolidation conceals certain facts that are of importance to the student of wage movements. However, we recognize that this is due to the necessary limitations of the scope of the work and is no fault of Professor Dewey’s. In fourteen industries ten or more separate occupations are tabulated, and in two more than twenty, while for five — brickyards, distilleries, pianos, rubber, and slaughtering — tabulations are made only for “all occupations” because of the unsatisfactory character of the returns; and the data for the silk industry were so confused that they were entirely excluded from the occupational comparison.

After all the returns for a given occupation were grouped together without regard to establishment lines, a further classification was made according to the rates of wages received. Thus in the first, and most important, series of tables, those in the “Comparison by Occupation” which extend through 779 pages, we have the classified wage groups within occupational groups, and it is at this point that it seems worth while to raise the question regarding the relative advantages of the method used. There are, Professor Dewey says in the Introduction, (p. xxiv), two methods of presenting wage statistics: (1) computation of an average;

(2) classification into groups. These are the two methods which are most frequently⁸—and in this case we are inclined to think mistakenly—opposed.

We understand that the purpose of such tables as Professor Dewey gives us in the comparison by occupation differs *in toto* from the purpose of the old average wage. The latter gave only the result of an investigation, and, however suspicious we might be regarding it, we were cut off from finding any other for ourselves; while such an exhaustive collection of statistics as we have here certainly aims to place the facts, and not merely conclusions from the facts, within the reach of all, so that he who will may form an independent judgment in the matter. The method we should prefer to compare with Professor Dewey's as a means of placing the materials for an independent investigation at the disposal of the public is that of complete presentation used in the Aldrich Report.⁹ The accompanying tables show the difference between the two methods. Table I presents the wages of machinists for 1890 and 1900 from one of the Dewey tables, and Table II the wages of a similar class of employees for 1890 and 1891 from the Aldrich Report.¹⁰

The special advantage of each method is clear. Professor Dewey's table is one step removed from the "actual rates of wages" and by means of it we are able to see just what percentage of the employees of this class is receiving a given wage in 1890 in comparison with 1900. On the other hand, there is the disadvantage—and we are inclined to think it a very considerable one—which attaches to any method of presentation which does not give a statement of actual rates of wages—and it is obvious that Table I does not tell us the actual wage of a single employee. There is no way of knowing from such a table whether the 19 employees in the eleventh group were getting \$13.95 in 1890,

⁸ *Vide* MAYO SMITH, *Economics and Statistics*, p. 325, in which he makes a statement similar to Professor Dewey's.

⁹ This method has also been used more recently on a small scale in *Bulletin 39* of the Department of Labor (pp. 696-707), presenting "Daily Rates of Wages Paid in Fourteen Plants of the American Steel Hoop Company."

¹⁰ *Wholesale Wages, Prices and Transportation*, Part 3, p. 1098: "Report for Establishment 58."

I					II				
WAGES OF MACHINISTS—DEWEY REPORT					WAGES OF MACHINISTS—ALDRICH REPORT				
Rates per Week (Dollars)	Number		Cumulative Percentage			Hours per Day	Different Employees	Sex	Wages per Day (Dollars)
	1900	1890	1900	1890					
	63	52							
8.50- 8.99	1	2	100.0	100.0	July, 1890	10	34	M	2.00
9.00- 9.49	..	..	98.4	96.2		10	12	M	2.25
9.50- 9.99	..	..	98.4	96.2		10	3	M	2.40
10.00-10.49	1	1	98.4	96.2		10	7	M	2.50
10.50-10.99	3	2	96.8	94.2		10	7	M	2.75
11.00-11.49	..	..	92.0	90.4		10	14	M	3.00
11.50-11.99	3	9	92.0	90.4		10	2	M	3.20
12.00-12.49	1	1	87.3	73.1	Average.....	10	79	M	2.37
12.50-12.99	10	1	85.7	71.2		10	73	M	2.00
13.00-13.49	8	5	69.8	69.2		10	23	M	2.25
13.50-13.99	21	19	57.1	59.6		10	3	M	2.40
14.00-14.49	13	6	23.8	23.1		10	28	M	2.50
14.50-14.99	2	2	3.2	11.5		10	31	M	2.75
15.00-15.49	..	..	....	7.7		10	17	M	3.00
15.50-15.49	..	3	....	7.7	July, 1891	10	2	M	3.20
16.00-16.49	..	..	....	1.9		10	4	M	3.25
16.50-16.99	..	..	....	1.9		10	3	M	3.50
17.00-17.49	..	..	....	1.9		10	3	M	3.50
17.50-17.99	..	1	....	1.9		10	184	M	2.39½
						10	184	M	2.39½

and the men in the same group were getting \$13.50 in 1900, or *vice versa*—a fact certainly of some importance if we are seeking for exact information. To anyone who may be interested in investigating the movement of wages during a given period the great advantage of such a presentation as that in the Aldrich Report is that he has at hand certain unquestioned facts as to the exact wages paid in specified occupations and industries, and it is open to him in working up the material to choose whatever method may seem best suited to the purpose he has in view. He may, if he wish, construct from it a series of classified wage groups; for a table like Professor Dewey's can always be derived from one in which the actual rates are given, while the latter can never be obtained from the former.

We do not wish to be considered unappreciative of Professor Dewey's work. He has given us the best collection of wage statistics that has ever come from the federal census, and his

method of presentation is one of proved scientific value for many purposes. The point, however, seems worth insisting on that, with the data in such form as we find them in the Aldrich Report, the investigator is given a free hand, while in the other he is not.

It is, of course, necessary to ask, not only whether the one method is superior, but whether it is equally practicable. In discussing the unit of division for his wage groups, Professor Dewey says:

The ideal method would be to arrange a series of gradations so minute that every employee would be assigned to his actual rate; this, however, is impracticable, both on account of the expense and of the difficulty, under the present limitations of statistical art, of grasping the significance of tables so elaborate in detail. (P. xviii.)

The two points raised regarding practicability are, then, the great expense involved in publishing tables of actual rates and the lack of significance in such tables. We have already pointed out, with regard to the latter point, that the Dewey classification shows certain things that the other table does not, and that the only question is one of relative advantage. So far as the other point is concerned we do not feel competent to speak, but it is, we think, reasonable to assume that, unless there was a very great difference in cost, Professor Dewey would not have been required to adopt a method he thought inferior merely because it was cheaper. Moreover, one has only to glance through the tables in the comparison by occupations to see that the method used has resulted in much space being wasted by the quotation on almost every page of a vast number of wage limits within which no employees are to be found,¹¹ and the volume has in consequence been made unduly ponderous. Moreover, the cumulative percentage of which we shall speak later, while a very convenient thing to have, we would willingly sacrifice for the actual rates. Indeed, we are inclined to think that for purposes of a scientific investigation nothing can quite compensate for their absence.

This cumulative percentage in the tables, and the substitution of the median and quartiles for the average in the summary of

¹¹ Pp. 112, 113, 130, 131, 272, 273, 306, 307 are extreme cases of the point we have in mind.

results, are two other features of Professor Dewey's method that should be noticed. By means of this percentage, which is given for both 1890 and 1900 in all of the wage tables, it is possible to see at once the proportion of the total number of persons in a given class who receive a wage as great as or greater than the lowest wage of the given wage group. By this device, as is pointed out (p. xxvi), one of the defects in the use of classified rates—the difficulty of comparing two given sets of returns—is overcome.

In the "Analysis of Occupational Comparison"—a chapter of seventy pages—an attempt is made to summarize and briefly describe the changes in wages that are shown by the general tables. In the summary tables in this analysis are given the median and quartiles, or the wages of the middle employee and of those who stand one-quarter and three-quarters of the way up the ascending scale in any occupational group; and here again we think it worth while to raise the question of relative advantage and ask whether this median wage, even if supplemented by the quartiles, is as useful for purposes of comparison as the average. Professor Dewey says in favor of the median that by its use "employees at exceptional rates, either low or high, are not given an undue weight or importance as they are when the average is used" (p. xxvii). Frequently, of course, there will not be a great difference between the median and average, but in many cases there is likely to be a wide variation. Our attention is called, for purposes of illustration, to the table showing the wages of maltsters in the central states, where Professor Dewey claims that, though the average is lower in 1900 than in 1890, the median, which is higher, "gives a truer presentation of the real condition." Examining this table (p. 375) a little more closely, and putting the results side by side, we have:

	1900	1890	Percentage of Increase or Decrease
Median	\$16.00	\$12.50	+28
Average	15.96	18.08	-11.7

While it is true that in 1890 only 48.5 per cent., and in 1900 98.9 per cent., of the number employed received a wage above \$13, it is equally true that in 1890 30.4 per cent. of the employees for that year received a wage greater than \$30, while in 1900 no one was employed at so high a rate. It is, we are inclined to think, open to question whether the median wage here showing an increase of 28 per cent. gives "a truer presentation of the real condition."

A point of some importance is that neither the correct average nor the correct median can be obtained from the Dewey tables, or from any tables that are based on a classification into wage groups. Even when the unit of division between the groups is, as in the present case, as small as fifty cents, there is room for a considerable variation from the true wage; thus in the above case, the median may not be \$16, but \$16.25. Professor Dewey's method of computing an average from such tables is to take the lowest wage of each wage group, as the wage for each individual in the group, and it is clear that the result is almost certain to be inaccurate. The median and average from such tables are, of course, very likely to be less than the true median and the true average; and the danger in using them for purposes of comparison lies in the fact that, though the figures for the two years may both be too small, they may not be correspondingly diminished. Without reviewing all of the arguments for and against the use of the average as a scientific term, it is clear that, while the average wage, even if obtained by correct weighting, may be of limited usefulness, if taken for all industries, or even for all employees in any one industry, the average wage for laborers in certain well-defined occupational groups is a term of unquestioned scientific value. There are, so far as we can see, no extremes within such an occupational group that are given an undue weight and importance, if in obtaining the average each wage is given an importance determined by the number employed at that special rate. If there are suspicious extremes, they should be rejected as questionable data, no matter whether the median or the average be taken. Mr. Bowley, in speaking of the superiority of the median for certain purposes, says, for illustration, that in finding an average income

"a single millionaire can counterbalance thousands of workingmen."¹² But this is clearly a case like that classic example of pigs and potatoes, for millionaires and ordinary workingmen ought not to be included in the same group, and if they are, the average for the group is a meaningless one. There would be as much reason for including in Professor Dewey's groups of wages in "all occupations" the salaries of the managers and firm members. The very great merit of the average wage is that it represents much more correctly every change in the wage scale, while the median, as Professor Dewey says, "is changed only by a transfer of employees from rates above the median group to rates below it" (p. xxvii).

Other defects in the use of the median are also pointed out and the table which follows is given to illustrate them (p. xxvii) :

The wage scale may be so precise that the tables present data in scattered groups rather than in even distribution throughout the series; then, since the median can never fall in any group not represented by actual returns, the change of a few individuals may cause a wide shifting of the position of the median. Or the groups containing relatively large numbers may be at a distance from the median group, while the group containing the median and the groups near to it may represent only a few persons; in that case also the change of a few individuals above the median rates may appear unduly significant.

Rates per Week (Dollars)	Actual Number		Cumulative Percentage		Position of Median and Quartiles	
	1900	1890	1900	1890	1900	1890
5.00-5.49.....	30	6	100	100	<i>q</i>	..
5.50-5.99.....	10	10	70	94	..	..
6.00-6.49.....	6	30	60	84	..	<i>q</i>
6.50-6.99.....	2	2	54	54	..	..
7.00-7.49.....	2	3	52	52	..	<i>m</i>
7.50-7.99.....	2	1	50	49	<i>m</i>	..
8.00-8.49.....	29	9	48	48	<i>q</i>	..
8.50-8.99.....	10	10	19	39	..	..
9.00-9.49.....	9	29	9	29	..	<i>q</i>
Total	100	100	...	...	..	..

It can be readily seen from this table that the median has shifted from \$7 in 1890 to \$7.50 in 1900—showing an increase

¹² BOWLEY, *Elements of Statistics*, p. 125.

of 7 per cent., though wages have evidently fallen. The average for 1890, \$7.24½, compared with the average for 1900, \$6.81, would have indicated a decrease of 6 per cent. What really displaced the median here was, of course, the change of one employee from the fifth to the sixth group; and this change might have been caused by the addition of one cent a week to his wages. Similarly, a movement of the same employee one group downward would have lowered the median by fifty cents.

Having granted that the use of the median is subject to many drawbacks, Professor Dewey then explains that he thinks they are due to the use of the median alone, and that they are corrected if the quartiles are also given. That is, in the last table, though the median alone shows a rise, the quartiles show the true downward movement. However, in this case, shall we say the decrease in wages has been $16\frac{2}{3}$ per cent. as indicated by the first quartile, or 11 per cent. as indicated by the second? Moreover, the supplementing of the median by the quartiles does not correct all of these defects, for, as Professor Dewey acknowledges (p. xxix), every change will not be indicated even if these three points, 25 per cent., 50 per cent., and 75 per cent., up the wage scale, are given; for if the changes are not radical enough to carry these points from the groups in which they were located before, the quartiles and median will none of them show a change. For this reason we are told that "the median and quartiles do not tell the whole story, and in doubtful cases the detailed tables should be examined." But what are the doubtful cases? We are inclined to think that if a precise and quantitative statement of the rate of change is sought, all of the cases are doubtful; that is, if we want to know, not only that the wages of a certain class of laborers have increased or decreased, but the rate of increase or decrease, then the statement in the summary is useless. To show the great difficulty of reaching any definite conclusions by means of the median and quartiles, we have constructed from the first of Professor Dewey's summary tables, that for carpet mills, a table of results which, instead of giving, as in the original table, the medians and both quartiles for the two years, shows the rate of

increase or decrease for 1900 over 1890 which each of these terms indicates:

WAGES FOR CARPET MILLS COMPARED FOR 1890 AND 1900.¹³

	Percentage of Increase or Decrease for 1900 over 1890 as Indicated by:		
	Median	1st Quartile	2d Quartile
MALES SIXTEEN AND OVER—			
<i>New England states—</i>			
Dye-house hands.....	No change	No change	No change
All other occupations peculiar to carpet mills.....	+50	+10	+10.5
All occupations.....	No change	+80	+9.5
<i>Middle states—</i>			
Dye-house hands.....	-13.6	-10	No change
Foremen and overseers.....	-3	+4	-9.7
General hands, helpers, and laborers.....	No change	+16.6	No change
All other occupations peculiar to carpet mills.....	-5.5	No change	+4
General occupations not peculiar to carpet mills.....	No change	-10	+10.7
All occupations.....	No change	No change	No change
<i>All sections—</i>			
Dye-house hands.....	No change	No change	-13
Finishers.....	+12.5	-14	+31.6
General hands, helpers, and laborers.....	No change	No change	No change
All other occupations peculiar to carpet mills.....	-5.5	No change	+4
General occupations not peculiar to carpet mills.....	No change	-10	+10.7
All occupations.....	No change	No change	No change
FEMALES SIXTEEN AND OVER—			
<i>New England states—</i>			
All occupations.....	No change	+28.5	-9
<i>Middle states—</i>			
Winders.....	No change	+37.5	-6
All other occupations.....	No change	No change	No change
All occupations.....	No change	No change	No change
<i>All sections—</i>			
All occupations.....	No change	+11	No change

It is evident that few definite conclusions can be drawn from such a table, and when we turn to the textual analysis we find that the results are even more uncertain than they appear. For example, when "no change" is indicated, we find that there has been "practically no change." There may have been a slight increase or decrease. In a group like that of "winders," where the median shows no change, one quartile a pronounced increase, and the other a decrease, the text says the rates for winders "show little change during the decade." If we wish for definite information, then, it would seem to be necessary to use the average as a court of last resort, which in this case, inaccurate as it may perhaps be, since it is not constructed from actual rates, shows that there has been an increase of 4 per cent. In the case of dye-house

¹³ Only that part of the table is given which deals with men and women of sixteen years and over.

hands in the middle states, where the table shows by the median a 13.6 per cent. decrease, a 10 per cent. decrease by one quartile, and no change by the other, we find by the text that there has been a "slight decrease;" but how much is this "slight decrease"? To be definite we must construct an average, and we find that there has in fact been a 9 per cent. fall since 1890. It would seem to be clear, then, that if we wish an accurate and definite statement of what the movement of wages has been, we cannot obtain this by comparing the median and quartiles for the two years. At most, the results that can be obtained in such a case are purely tentative, and it does not obviate the difficulty for us to be told that "in doubtful cases the detailed tables should be examined;" for, as we have pointed out, if an exact and quantitative statement of the change is sought, resort must always be had to the detailed tables, and the summary is valueless. Moreover, resorting to the detailed tables is not very illuminating to the average citizen, for it is not easy, to quote Professor Dewey's own words, used in a slightly different connection, to grasp "the significance of tables so elaborate in detail." If the purpose of the summary was correctly stated to be to give "the results derivable from the detailed tables in a form in which they can be readily compared," then it has failed in its purpose. To ask the ordinary reader to compare the wages for thirty-four different industries at three points along the scale, and then expect him to form a judgment of what the wage movement for the last decade has been, is to ask the impossible. Nor does it help matters to refer him to the detailed tables, for the average person is quite helpless when faced by 600 pages of tables; they mean nothing to him, and it is a part of the work of the statistician to make them mean something. If a summary cannot be presented which will mean something—and that something not misleading—we have an open confession of failure on the part of statistical method.

It should be noted that Professor Dewey believes that the "treatment of wage statistics should be as far as possible descriptive." It is, he says, "far more important to know that one-half of the laboring class receive wages between \$1.25 and \$1.75 per day than to know that the average of the total is \$1.50." Whether

or not this is true depends upon the purpose we may have in view. If we wish to show what the movement of wages has been from one period to another, and we had to compare thirty-four of these wage limits, we should not be inclined to agree with the statement. To compare only the average wage of all employees for two periods is, of course, open to certain well-founded objections. It may be that men have not been paid more or less for doing one specific thing, but that the proportions of skilled and unskilled labor have been changed. However, that this average has a certain limited usefulness is shown by Professor Mitchell¹⁴ in his study of the movement of wages during the Civil War — unquestionably the most complete study of the movement of wages that has been made for any period of our history. Of course, such a single average would have meant very little given alone, but if we had been given an average wherever throughout the summaries the medians and quartiles are used, it would have been possible to arrive at very definite and valuable conclusions as to just what the wage movement for the decade was; and whenever we have laborers in well-defined occupational groups, such as, in the table for carpet mills, dye-house hands, finishers, winders, or even “general hands, helpers, and laborers,” the averages would unquestionably be valid and significant. The average certainly has the merit of giving positive results instead of vaguely inconclusive statements; nor do we think there would be any question here of sacrificing truth to definiteness. The average, it is generally agreed, is not a substitute for the facts, but a means of enabling the mind to grasp the significance of a complex mass of data; and while no conclusions at all are to be preferred to fallacious ones, the average, rightly computed and rightly used, does not lead to the latter.¹⁵

¹⁴ MITCHELL, *History of the Greenbacks*, p. 309. “While a series of such averages does not present the facts concerning the changes in wages of any specific individuals or groups, it is nevertheless the only means by which a general notion regarding the circumstances of the whole class of workingmen can be arrived at.”

¹⁵ On this point see DR. VENN’S very interesting article on “The Nature and Uses of Averages” *Journal of the Royal Statistical Society* for 1891. Also the article by CARROLL D. WRIGHT on “The Evolution of Wage Statistics,” *Quarterly Journal of Economics*, Vol. VI.

There is one other defect in regard to the use of the median, or median with quartiles, which we have not noticed, because, while of interest so far as the general question of method is concerned, it does not very closely affect the volume in hand. This point, to which our attention is called in the Introduction (p.xxvii), is that if the number of items is small, or the workmen employed are massed at a few rates widely separated from one another, the basis of comparison furnished by the median and quartiles is not satisfactory. This can be readily seen from the following table, which is quoted (p. xxvi) as an illustration:

RATES PER WEEK (Dollars)	BEAMSTERS			
	Number		Per cent.	
	1900	1890	1900	1890
19.00-19.49.....	.....	1	.....	10.0
15.00-15.49.....	.....	.....	.....	.....
13.00-13.49.....	4	2	80.0	20.0
12.50-12.99.....	1	.....	20.0	.....
12.00-12.49.....	.....	7	.....	70.0
Total	5	10	100.0	100.0

It is, of course, clear that the median and both quartiles fall together in the \$12.00-12.49 group in 1890, and in the \$13.00-13.49 group in 1900; and if we should accept the conclusions of the median and quartiles here, we should have an increase of 8 per cent., while the average shows no change. For the most part, however, the numbers in this volume are so great that this situation does not occur here, and the point is practically worth raising only in connection with the general question of method.

When we come to a consideration of the question, "What conclusions are reached regarding the trend of wages during the decade?" we find it a very difficult one to answer. Such conclusions as are reached are to be found in the summary, which we have already discussed, and in which, as we have shown, no definite statements regarding the movement of wages in any or all industries are to be found. In the textual analysis accompanying the tables we find vaguely indefinite statements: that in the

iron and steel mills "apparently little change took place in the wages of men in the three sections adequately represented by the returns;" or in the paper mills, that the "industry shows little change in the rates for men and a slight decrease for women;" or in the tobacco industry, that "on the whole the returns indicate very little change during the decade, either for men or women;" or of tanneries, that "the returns indicate considerable decrease in wages during the decade." We are inclined to ask just what is meant by such noncommittal expressions as "apparently little change," "very little change," "slight variation," "a definite though not a great decrease," "slight decrease," "considerable increase," that are to be found in the text. If we wish to know what the trend of wages has been, a quantitative statement is essential.

What, we wonder, are we expected to conclude from this statement regarding wages in agricultural implements?

Since for a part of the employees reported only earnings can be obtained and for a part only rates, it is not possible to make a single tabulation for the entire industry.¹⁶ It is evident, however, from the various tabulations in the several sections that wages of males sixteen and over changed little in the New England and middle states, probably increased only slightly in the central states, and decreased slightly in the Pacific states (p. 1).

After the summary for each section a "General Summary" is given (p. xcix), but with regard to this, as with regard to those just discussed, we are inclined to believe that the average citizen in search of information will find himself mystified rather than enlightened. The "General Summary" is divided into five parts, one for each of the five sections, with no attempt to give any generalizations with regard to the whole country. We quote the first part of the summary—that for the New England states—to show the general character of the whole:

New England states.—The wages of men sixteen and over increased in three of the textile industries—"cotton mills," "dyeing and finishing textiles," and "woolen mills"—and changed little in the "carpet" and "knitting

¹⁶ This discouraging statement introduces several of the general summaries: carpet mills (p. xxxii), cotton mills (p. xxxvii), knitting mills (p. xli), woolen mills (p. xvli), agricultural implements, (p. 1), wagons and carriages (p. lvii), car and railroad shops (p. lix), cigars (p. lxxvi), printing (p. xc), shoes (p. xcv).

mills;" those of females sixteen and over increased in "cotton," "knitting," and "woolen mills," and changed little in "dyeing and finishing textiles." In "woolen mills" an increase is shown for children of both sexes. In the metal-working industries little change is shown in the wages of males sixteen and over in "foundries and metal-working;" in "shipyards" there is a decrease; "cigars," "paper mills," and "printing" show increases in the wages of males sixteen and over; "bakeries" and "rubber," little change; and "shoes" and "tanneries," decreases. For females sixteen and over, increases are shown in "clothing" and "printing," and little change in "paper mills."

We are inclined to wonder, after reading such a summary for each of the five sections, whether the report has fulfilled its mission of "promoting a definite termination of the question whether wages have tended to increase or decrease during the decade."¹⁷ It seems clear that to do this we should have had some quantitative statement of just how much wages had risen or fallen since 1890. This the volume certainly does not give us. We are told in the Introduction that "statistical art has its limitations; especially is this so in problems requiring descriptive treatment, such as wages." No one would question the statement that "statistical art has its limitations," but we are unwilling to admit that they are as great as the summary seems to indicate. No one who is familiar with Professor Mitchell's study of wages, to which we have already referred, can doubt the ability of the statistician to reduce the movement of wages to a quantitative expression.

This failure of the report to give any positive statement of what the trend of wages has been is the more to be regretted because in its absence the figures given in the Census of Manufactures are likely to be quoted as an authoritative statement of the fall of wages since 1890. The figures are, of course, shown to be valueless for purposes of comparison, but they are temptingly definite, and many people will use the figures who do not stop to read the explanation. The Bureau of Labor showed¹⁸ by an investigation of only 148 establishments representing 26 industries that wages had risen 3.43 per cent. from 1891 to 1900, and that wages were higher in 1891 than in 1890. The department expressed itself as of the opinion that, while data were lacking for

¹⁷ *Twelfth Census of Manufactures*, Vol. I, p. cxxv.

¹⁸ *Bulletin No. 30 of the Department of Labor*, pp. 913-15.

a "strictly scientific calculation of relative wages," yet, on the whole, the results were "entirely fair and undoubtedly approximate very closely the actual conditions for the whole country." If the report on the basis of its more extended data could have either proved or disproved this statement, it would have met what we believe is a very general and genuine demand for authoritative information on an important subject. Whether or not the department had sufficient data to show a rise of over 3 per cent., it is probably safe to assume that wages were at least no lower in 1900 than in 1890, and in this event real wages were probably slightly higher. We question seriously whether they are as much higher as the Bureau of Labor has shown in another Bulletin,¹⁹ in which there is a rise in real wages from 165, the index number for 1890, to 195, the index number for 1899.²⁰ But prices in 1900, as later and very extended investigations of the bureau have shown, were very slightly below the level for 1890, for the index number for wholesale prices is 112.9 in 1890 and 110.5 in 1900,²¹ while the relative retail price of food weighted according to the average family consumption was in 1890, 102.4, and in 1900, 101.1.²² It follows then, that even if money wages fell slightly between 1890 and 1900, real wages were little if any lower at the end than at the beginning of the period.

One other point should be noted before we leave the subject of the wage movement during the decade, and that is, that no decennial investigation can ever show the real "trend of wages." In the present instance, if the wage movement has been at all like the price movement for the decade, the line from 1890 to 1900, instead of being nearly straight, would be like the outline of an inverted pyramid with the point of depression at 1896. Wages undoubtedly fell during the middle of the decade, but recovered again before the close, so that a decennial investigation would indicate an almost stationary condition, though a very radical

¹⁹ *Bulletin No. 38*, Table III, between pp. 126 and 127.

²⁰ There is no figure for 1900, but had the table been carried out, it would probably have been higher than the one for 1899.

²¹ *Bulletin No. 37*, p. 235.

²² *Bulletin No. 49*, p. 1139.

change undoubtedly occurred. If statistics of wages cannot be collected annually by the census—and we suspect this is the case—then provision should be made that will enable the Department of Labor to carry on such an investigation; for it certainly is not unreasonable to demand that we may sometime have as satisfactory information regarding annual changes in wages as the Bureau of Labor has given us in regard to the movement of prices.²³ The question should also be raised whether data collected only from manufacturing industries, with such important classes of wage-earners as agricultural laborers, miners, and railway employees excluded, are sufficient to establish the correct wage movement for the decade. It is, of course, clear that with regard to these last two points, the present census is in no sense to be criticised, for it obviously could not do things for which no provision had been made; but we have every reason for hoping that with a permanent Census Bureau much can be done in the future, in the matter of wage statistics as well as other things, that has been impossible in the past.

There are some other features of the book which should be noticed briefly. The first of these is the comparison by establishments, the tables for which occupy 361 pages. The purpose of this comparison is to show the "sort of changes that have taken place between 1890 and 1900 in individual mills and factories, and the relation of these changes to the general course of wages during the decade" (p. xxiii). At the beginning of each of the series of tables in the establishment comparison there are concise statements of the normal working time per week—which, we may note in passing, has in a very large number of cases decreased since 1890; and the change, if there has been any, in the class of labor employed—whether a substitution of women and children for men, and *vice versa*—is noted. An explanation is also given of the important changes in the method of production during the decade, and an interesting illustration of this is that in one of the cotton mills there had been a 10 per cent. increase in product through the establishment of improved machinery. Some inter-

²³ See the very admirable series of price quotations in the *Bulletins* for March, 1902, and March, 1903.

esting information regarding the effect of changes of method on wages is given in the analysis of occupational comparison. For example, in the tobacco industry hand-work has been superseded by machinery, with very little change in the wages for either men or women (p. xcix); in printing, the substitution of machine for hand compositors radically changed the character of the work, and the wages of both men and women have increased (p. lxxxix); with regard to the clothing trade we are told that "the practice of having parts of the work done by contract has taken away from the industry of clothing manufacture the unity it at one time possessed" (p. lxxviii), and this is one of the industries in which we find a marked decrease in the wages of men and a slighter decrease in women's wages.

Other tables of which we have not spoken are those which form "The 1900 Total," so called to distinguish them from "The 1900 Comparison." This series of tables includes all of the returns for 1900, including those from fifty-five establishments employing 14,545 employees, which were excluded from the comparison because satisfactory returns for 1890 could not be secured. In these tables also are included those returns which were rejected from the comparison, though the establishments from which they came were not; that is, while certain occupations within two industries might be fairly compared for the two years, others could not be, but all are brought together in these tables of totals. These, it is hoped, may be "useful for comparison with future investigations and to determine absolute rates for all persons possible in 1900," but we are warned that for purposes of comparison with wages in 1890 the returns in the comparison tables should be used; and, of course, with good reason, for great effort was made that the data in these should be fairly comparable.

Much interest also attaches to the thirty-one tables representing nine industries which furnish basis for a comparison of rates and earnings. While it is generally agreed that earnings are of more interest than rates, there are great difficulties in obtaining data for the former which will be comparable for any two years. In the present volume, therefore, where pay-rolls showed the earnings they were tabulated separately, and in the "Analysis" (p. xxx) it

is pointed out that, on the whole, the parallelism between rates and earnings is very close, with a tendency, when a large number of persons is considered, for rates to be somewhat higher than earnings. Mention should also be made of the very useful "Glossary" at the end of the volume, which furnishes a great deal of information that is ordinarily not easy to obtain. A list of the occupations peculiar to each of the thirty-four industries is given, and each of these occupations is briefly described, and the degree of skill indicated which is necessary for the work.

There is, indeed, abundant evidence all through the volume to show that it is the result of much thought, painstaking care, and patience. Every possible effort was made to secure accuracy, and the four series of tables, covering more than 1,100 pages, are as nearly perfect in their way as the most critical statistician could desire. While we regret that tables of actual rates were not used, particularly in the occupational comparison, and while we think that the report should have furnished definite conclusions regarding the trend of wages, yet we realize that the volume represents a great advance over all other census wage statistics in accuracy and completeness, as well as in methods of tabulation and presentation, and that Professor Dewey has given us, as we have said before, the best collection of wage statistics ever published by the Federal Census.

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